THE EFFECTS OF FEEDING DIETS CONTAINING SEA-GRASS ON THE FINAL BODY WEIGHT, CARCASS PERCENTAGE, AND ABDOMINAL FAT OF BROILERS

(Pengaruh Penggunaan Rumput Laut Dalam Ransum Terhadap Berat Badan Akhir, Persentase Karkas, dan Lemak Abdominal dari Ayam Broiler)

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ABSTRAK

Studi ini dilakukan untuk mengamati pengaruh pemberian ransum tanpa rumput laut (kontrol) dan ransum yang mengandung rumput laut (masing-masing 4,5% *Euchema cottonii;* 4,5% *Gracillaria verucosa*) terhadap berat badan, persentase karkas dan lemak abdomen broiler. Lima puluh empat ekor D.O.C.broiler unisex strain SUR-707, diacak ke dalam 18 petak kandang dan diberi ransum *isocalorie-isoprotein* mengandung 4,5% rumput laut yang berbeda (*Euchema cottonii;Gracillaria verucosa*) serta kontrol. Parameter yang diteliti adalah penampilan performa broiler. Berat badan diukur berdasarkan berat hidup ayam setelah 42 hari, pada akhir periode penelitian. Setelah dipotong, ayam diproses untuk berat karkasnya. Lemak abdomen sebagai bagian dari limbah ditimbang beratnya sedangkan persentase karkas dihitung sebagai perbandingan antara berat karkas dengan berat hidup dikalikan 100%. Hasilnya menunjukkan tidak ada perbedaan yang nyata (P>0,05) diantara kelompok perlakuan terhadap semua parameter. Sekalipun secara statistik tidak terdapat perbedaan yang nyata, secara angka terlihat adanya perbedaan pada semua parameter. Dengan demikian sebagai kesimpulan, perlakuan rumput laut mempunyai kecendrungan menghasilkan persentase karkas yang lebih besar dengan lemak abdomen yang lebih sedikit dibandingkan ransum tanpa rumput laut (kontrol).

Kata kunci : Rumput laut, Berat hidup, Karkas, dan Lemak abdomen

ABSTRACT

This study was carried out to investigate the effects of feeding diet without sea-grass (control) and diets containing sea-grass (4.5% *Euchema cottonii* or 4.5% *Gracillaria verucosa*) on final body weight, carcass percentage and the abdominal fat of broilers. Fifty-four 1-day-old SUR-707 unisex broiler chicken, were randomly placed into 18 cages and fed *isocalorie-isoprotein diets* containing 4.5% of two different sea-grass sources (*Eucheuma cottonii* or *Gracilaria verrucosa*) and control. Parameters observed were production performance of broiler. Body weight was measured by the live weight of the birds at 42 days, end of study period. After slaughtering, birds were processed for carcass weight. Abdominal fat as part of waste was measured by weight and carcass

percentage was expressed as the ratio of carcass weight and final body weight times 100%. The results showed that treatments had no significant effects (P>0.05) on all parameters. Although the differences were not statistically different, the results showed numerical differences for all parameters. In conclusion, sea-grass treatments have a tendency to produce higher carcass percentage and lower abdominal fat than diet without sea-grass (control).

Key words: Seaweed, Live body weight, Carcass, Abdominal fat

INTRODUCTION

Poultry production is an important branch area of the agricultural economy in Indonesia. Broiler management is simple, cheap, and short possible way to have the yield. Besides the broiler meat is a good source of animal protein and it is suitable for human food in all stages of life. There is a misconception of the consumer about broiler carcass being higher in fat content; however, according to Leenstra (1987), the main fat depot is the abdominal fat and not muscles.

Several years ago, the animal fat in amount and preparation in human diets was associated with the occurrence of cardiovascular diseases. It is widely acknowledged that there is an urgent need to return to a balanced fatty diet by decreasing intake on animal fat and cholesterol (Cabel and Waldroup, 1990; Ozdogan and Askit, 2003).

The poultry meat is inherently low in fat. However due to increasing public demand for low fat, interest in manipulating the lipid composition of poultry meat via dietary changes has become focus of several studies. The researchers have increased interest in carbohydrate metabolism in poultry, since fraction of indigestible carbohydrates is seen to play an important role in avian digestive physiology and consequently have a bearing on production results (King *et al.*, 2004). Dietary carbohydrates serving as the main source of energy in the poultry include readily available carbohydrates (RAC) and non-starch polysaccharides (NSP). The digestion of these NSP fractions is more variable due to lack of endogenous digestive enzymes and their tendency to increase intestinal viscosity (Choct *et al.*, 1999). The importance of proportion and source of NSP have been determined by different researchers for productivity of the body weight, carcass, and abdominal fat which is added to the poultry diets.

According to Bird and Benson (2000) components of sea-grass are carbohydrates (sugar and vegetable gum), protein, fat, phosphorus, calcium, sodium, potassium, iodine, iron, vitamin A, vitamin B-1, vitamin B-2, vitamin B-6, vitamin B-12, and vitamin C. *Eucheuma cottonii* and *Gracilaria verrucosa* are varieties of the sea-grass, rich in NSP and commercially available as food for human consumption (Sumardi *et al.*, 2005). Sea grass is an export materials, so in the present experiment rejected sea-grass (not fit for human consumption) was used. Mead (2007) observed that the gelatin made from sea-grass can inhibit key enzymes in the cholesterol and fat or lipid biosynthetic pathways. Thus, studying the effects of sea-grass on final body weight, carcass production and abdominal fat of broilers could be of immense help in removing the misconception of consumer while preparing healthy human diets.

MATERIALS AND METHODS

A total of fifty-four 1-day-old SUR–707 unisex broiler chicks were randomly distributed into 18 cages and fed *isocalorie-isoprotein diet* containing no sea-grass (T1 – control diet) and diets containing 4.5% of two different sea-grass sources, either *Eucheuma cottonii* (T2) *or Gracilaria verrucosa* (T3) for a period of 42 days.

The experiment was carried out according completely randomized design consisted of 3 treatments and 6 replicates for each treatment and there were three chicks for each cage. The feed ingredients and chemical composition of the experimental diets are shown in Table 1.

Table 1. The feed ingredients and chemical percentage composition of the experimental diets

Ingredients (%)	T_1 Control diet	T_2 *Euchema cottonii* diet	T_3 *Gracillaria verucosa* diet
Soybean cake	6.0	6.2	9.0
Fish meal	8.0	7.0	5.0
Blood meal	9.0	8.8	8.0
Rice bran	14.0	8.0	8.0
Corn dent yellow	54.0	65.5	65.5
Euchema cottonii	-	4.5	-
Gracillaria verucosa	-	-	4.5
Top mix	0.5	0.5	0.5
T O T A L :	100.5	100.5	100.5
Composition :			
ME (Kcal/kg)	3.139	3.139	3.140
Crude Protein (%)	20.34	20.38	20.30

Parameters measured in this particular study were final body weight, carcass percentage, and abdominal fat of broilers which were taken at the end of the experimental period of 42 days. The final body weight was measured in kg using mechanical balance. Right after slaughtering, broilers were processed for carcass weight measurement by cut up without waste. Abdominal fats as part of waste were measured by weight and carcass percentage is expressed as the ratio of carcass weight and final body weight times 100%.

The chemical composition of the experimental diets was determined followoing the procedures provided by AOAC (2005) at Feeds Chemistry Laboratory, Faculty of Animal Husbandry, Hasanuddin University.

All experimental data were analysed using analysis of variance according to completely randomised design (Snedecor, 2002). All statistical analysis were performed using SPSS computer program – version 13.0 (Nie *et al.*, 2005).

RESULTS AND DISCUSSION

All chicken were generally in good health throughout the experiment. The effects of different sea-grass diets in three groups are shown in Table 2.

Table 2. Final body weight, carcass weight, and abdominal fat values of broilers fed with different sea-grass diets

Treatments	Final Body weight (kg)	Carcass weight (kg)	Carcass percentage	Abdominal fat (g)
Control (T_1)	1.542	1.023	66.34	26.17
Euchema cottonii (T_2)	1.420	0.982	69.15	14.17
Gracillaria verucosa (T_3)	1.471	1.028	69.88	24.67
SEM	0.044	0.080	3.32	4.81

There were no significant differences in final body weight, carcass weight, carcass percentage and abdominal fat among the treatment groups. Although the differences were not statistically different, the results showed numerical differences for all parameters. Thus, sea-grass treatments have a tendency to produce higher carcass percentage and lower abdominal fat as compared to the controlled diet. These results indicated that there was no effect of crude fiber and bulkiness of diet containing sea-grass on broiler fore-gut, especially the effect of enzymes digestion. This could be due to higher solubility of sea-grass in aqueous milieu of the digestive tract and which could easily flow through the gizzard requiring less mechanics, and action of the muscle wall (Kustiawan and Manullang, 2007). It means that the diets containing 4.5% sea-grass is able to support the broiler growth.

Sea-grass is a natural source of non-starch polysaccharide, with high fiber content and high levels of bioactive/anti nutritive factors including viscosity along the gut, this in turn causes changes in gut microflora and efficiency of nutrient utilization by the chick (Newcombe and March, 1988). Furthermore, the effects of solubility on digesta viscosity and fibre digestibility throughout intestine were increased and short chain fatty acid (SCFA) in caeca.

Promthong *et al.*, (2007) found that the fermented products of SCFA were mainly acetate, propionate, and butyrate. Acetate being the basic element of lipid cholesterol is synthesized via *de-novo biosynthesis* by microflora. When bacterial growth and fermentation occurs, acetate passes primarily into the blood and get deposited as fat in the liver, muscle/meat, and abdomen (Chaplin, 2007). In this experiment, broiler receiving diet without sea-grass may have a tendency to produce higher acetate levels than those fed sea-grass diet, hence the carcass percentage was higher and abdominal fat was lower than the control.

CONCLUSION

Diet containing sea-grass has effects on solubility of digesta viscosity and fiber digestibility throughout intestine and SCFA levels were increased. Broilers fed with sea-grass could produce lower acetate in the caeca while those fed with no sea-grass diet, produced higher acetate levels. In other words, sea-grass treatments have a tendency to produce higher carcass percentage and lower abdominal fat than no sea-grass (control).

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